

Dual

Edition February 1980

C 810

Service Manual

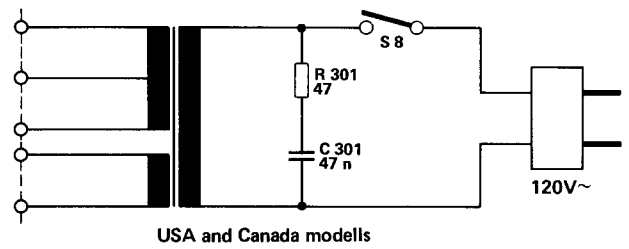
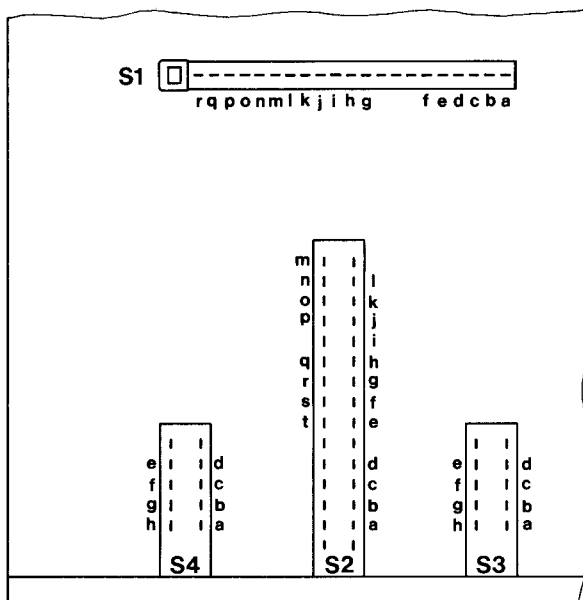


Technical Data

The unit meets or exceeds the requirements of DIN 45 500 for domestic HiFi equipment. The data given is based on the current DIN reference tapes.

Tape speed	4.75 cm/s
Deviation from correct speed	± 0.7 %
Flutter and wow	
Weighted RMS	± 0.045 %
To DIN for reproduction only	± 0.09 %
To DIN for recording/reproduction	± 0.13 %
Frequency response (ref. to DIN tolerances)	
Standard Fe tape	20 – 16,000 Hz
CrO ₂ tape	20 – 16,500 Hz
FeCr tape	20 – 17,000 Hz
Signal-to-noise-ratio (weighted)	
With Dolby NR	
Fe	63 dB
CrO ₂	63 dB
FeCr	66 dB

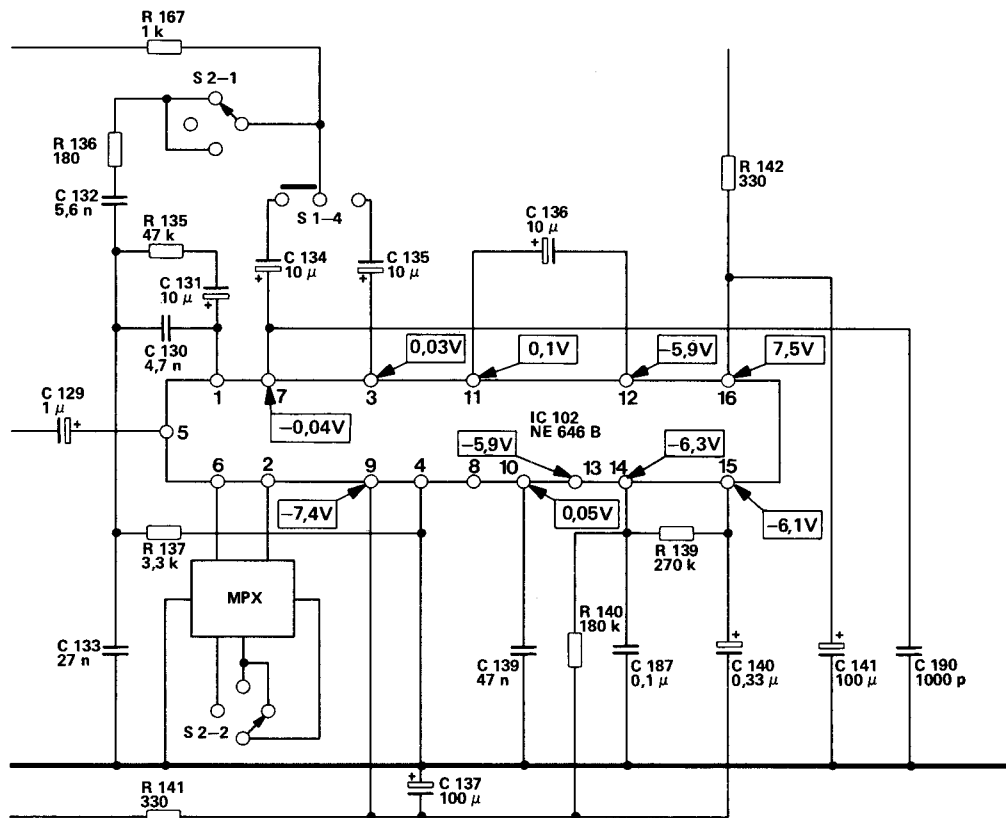
Channel separation at 1000 Hz	
between stereo channels	40 dB
in opposite direction	70 dB
Erase at 1000 Hz	70 dB
Oscillator (push-pull oscillator)	105 kHz
Inputs	
(sensitivity at 0 dB)	
Microphone (1/4" coaxial jack))	0.3 mV/ 5 kOhm
Receiver/amplifier (DIN connector)	1 mV/10 kOhm
Receiver/amplifier (RCA jacks)	80 mV/70 kOhm
Outputs	
Receiver/amplifier (DIN connector)	580 mV/ 5 kOhm
Receiver/amplifier (RCA jacks)	580 mV/ 1 kOhm
Headphones (volume adjustable)	
(1/4" coaxial jack)	4 – 2000 Ohm
Fast winding time for C 60 cassettes	60 sec.
Tape monitor (electronically) shut-off time	1.5 sec.
Line voltage	120 V and 230 V
Line frequency	50/60 Hz
Power requirement	approx. 15 Watt



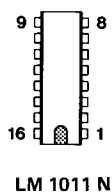
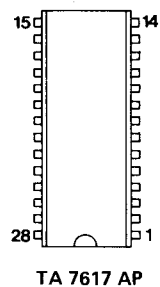
Bei Verwendung des IC NE 646 B (IC 102) ist die nebenstehende Beschaltung gültig.

When using the IC NE 646 B (IC 102) the circuitry shown on the right side is valid.

Lors de l'utilisation du court-circuiteur, IC NE 646 B (IC 102), le schéma de branchement ci-contre est valable.

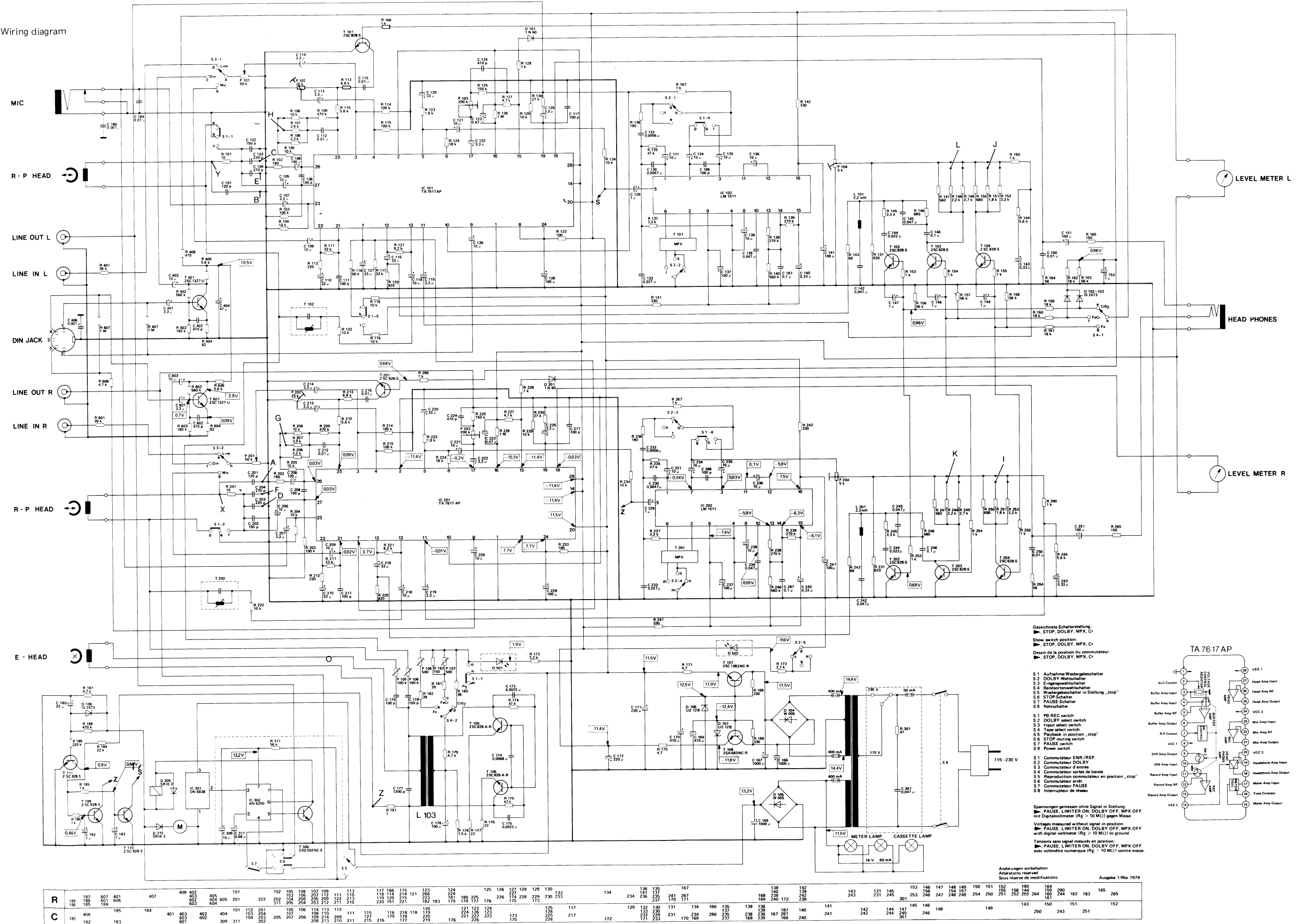


IC's von der Bestückungsseite gesehen
IC's as seen from the top side
IC's vus du côté éléments



2 SA 683 NC-R
2 SC 1327 U
2 SC 828 S
2 SC 1383 NC-R
2 SD 592 NC-R

Wiring diagram



Functional description C 810 electronic section

In this unit, all active functions necessary for record and playback except the HF oscillator, tape-type selection and DIN input amplifier are combined in two integrated circuits per channel.

Playback

The voltage induced in the magnetic head (approximately 300 μV during playback of the DIN reference level) is fed to the playback amplifier input (PIN 27). One part of the output voltage (PIN 25) reaches the inverting input (PIN 26) via the degenerative feedback network R 106, R 109 and C 112, thereby determining amplification and corresponding equalization. By altering the magnetic head resonance by means of capacitors C 101 — C 104, the frequency response in the treble range may be corrected. Mid-range may be altered slightly by means of R 107 or R 108. Playback equalization is switched from 120 μs to 70 μs by means of T 101. The playback level is set using VR 102 to 580 mV at the output jack by playing back the Dolby reference level. This is necessary if the Dolby circuit is to function perfectly. The playback signal from VR 102 now reaches the electronic record/playback switching circuit via PIN 4 and is fed to the Dolby processor IC 102 via PIN 5. If the Dolby selector switch S 2 — 1 is switched off, the signal in the Dolby circuit is amplified by approximately 26 dB. If S 2 — 1 is switched on, in the case of a low-value signal, amplification is carried out dependent upon frequency and level.

From output (PIN 7) of the Dolby circuit, the signal reaches the LINE output via S 1 — 4, also reaching PIN 10 and PIN 19 from IC 101. PIN 19 is the input to the headphone amplifier, PIN 10 the input to the DIN output amplifier. The headphone signal is amplified to a value of approximately 1.6 V and then fed to the headphone jack via PIN 18. The DIN output signal is only fed via PIN 9 to outputs 3 and 5 of the DIN jack during playback so as to eliminate input crosstalk during recording via DIN connection leads. The DIN output amplifier is arranged as an impedance transformer and is not characterized by voltage amplification.

In order to prevent switching noise reaching the output jacks, the output signal is muted by means of switch S 6 when the start key is not depressed. Once the start key is depressed, the signal through T 109 or T 110 at the input to the Dolby circuit remains muted until the capstan reaches the appropriate speed so as to eliminate audible "high-level howling".

Recording

Three different sources are available for recording, all of them being fed to the record level regulator P 101 by means of S 3 — 1. The line input leads directly to the input selector switch while the signal at the DIN input is amplified by means of T 401. This amplification stage is designed in such a way that very satisfactory signal to noise ratios are achieved at energization levels in accordance with DIN 45 511. The signal at the Mic input is amplified by approximately 43 dB via PIN 23 in the IC 101. The signal is then fed from PIN 21 to the input selector switch.

Having passed through the record level regulator P 101, the signal is fed to the electronic record/playback switch PIN 4, and, via PIN 5, thereafter taking the identical path to the Dolby circuit as previously described in the section "playback". Between PIN 2 and PIN 6 of the Dolby integrated circuits, a 19 kHz (MPX) filter may be switched in as desired using S 2 — 2 in order to suppress any residual pilot frequencies when recording from radio. Such residual pilot frequencies could impair effective functioning of the Dolby processor.

Unlike playback, the signal (PIN 3), unaffected by the Dolby process, reaches the outputs and switch S 2 — 1 via S 1 — 4. If S 2 — 1 is actuated, the record signal at PIN 7 is "dolbyized". The recording amplifier is likewise located in IC 101. The recording current is set using VR 104 before the input (PIN 11) as is level matching for the various types of tape by T 103 or T 104. The record equalization degenerative feedback network is arranged between PIN 13 (output) and PIN 12. Equalization for Cr- or FeCr tapes is switched via T 102 and T 103.

The record signal is fed to the magnetic head via wave trap L 102, magnetic bias being provided by VR 106. The frequency of the HF oscillator (T 105, T 106) is approximately 105 kHz. The operating point for FeCr- or Fe tapes is set by VR 107 and VR 108.

Record level indicator

During both record and playback, the output signal reaches the meter amplifier, likewise located in IC 101 (PIN 17). The DC voltage resulting at the output (PIN 15) is then fed to the moving-coil instruments of the record level indicator. Calibration is by means of VR 103. In order to allow for reduced modulability of tapes at high frequencies, frequency response correction is carried out by R 125 and C 124. Boosting by 400 Hz at 10 kHz amounts to approximately 10 dB. Indicator return is attenuated by means of C 123 in order to transform the record level indicator into a sort of "semi-peak-value indicator".

Limit switch

The limit switch serves to switch the unit off whenever a cassette has reached the end of the tape. Furthermore, the unit must be switched off if the tape is not being properly taken up, e. g. owing to too great friction in the cassette.

If the ring magnet no longer rotates, pulses cease to occur at the output of IC 301. If the pause function is not depressed, IC 302 then triggers the stop function via T 306 by means of the pull magnet PL.

Power section

The power section supplies the electronic system with a negative and a positive operating voltage of approximately 11.5 V in each case which is regulated via T 107 or T 108. The motor is supplied with a non-regulated voltage of approximately 13 V as a regulator circuit is located within the motor.

Dual C 810 – electrical alignment

Necessary instruments and cassettes

- 2 Millivoltmeters
- 1 AF oscillator
- 1 Oscilloscope
- 1 Frequency counter
- 1 Test cassette 400 Hz –20 dB, 10 kHz –20 dB
- 1 Test cassette Fe₂O₃-reference medium section, CrO₂-reference medium section
- 1 Test cassette 400 Hz Dolby level 200 nWb/m

General notes

Before adjustment, the magnetic head and all ferrous components in contact with the tape must be de-magnetized!
Readjustment must be carried out in the sequence stated.

Playback

Magnetic head adjustment

Remove the cover plate at the record/playback head, insert the test cassette (section determined for gap adjustment), 10 kHz –20 dB.

Connect the millivoltmeters to outputs L and R (cynch connection jacks). If only one instrument is available, then switch the outputs in parallel.

Fe, ►

Using the adjustment screw to the left side of the magnetic head, adjust for maximum voltage. After adjustment, the adjustment screw should be secured in position with locking lacquer.

Note: with parallel switched outputs, there will be secondary peaks; adjust for the main peak.

The difference between channel 1 and channel 2 at 10 kHz can be at max. 5 dB.

Playback level

Insert test cassette, 400 Hz Dolby level

Fe, Dolby NR, ►

Adjust for 580 mV $\pm$ 0.25 dB in each case

For track 1 use VR 102 at cynch output L

For track 2 use VR 202 at cynch output R

Playback frequency response

Insert test cassette, 400 Hz –20 dB, 10 kHz –20 dB

Fe, ► (Dolby: off)

Both level sections of the test cassette should have the identical output voltage at outputs L and R.

VU-meter

Fe, record, Dolby NR, ►

AF oscillator at input, millivoltmeter (AC) at output, record level regulators VR 101 and VR 201 fully clockwise.

Set the AF oscillator to 400 Hz and alter the input signal at the cassette deck so that a level of 580 mV occurs at outputs L and R.

Using potentiometers VR 103, the VU-meter left channel and VR 203, the VU-meter right channel adjust for 0 dB record level.

Background noise

Screen amplifier, ensure that the magnetic head is free of hum.

Fe, pause, ►

Maximum measured background noise at outputs L and R less than 3 mV, measured with a 20 Hz filter (e. g. Sennheiser FO 55, curve 2.20 Hz –3 dB) and rms rectification of meter.

HF generator

Cr, record, ►

Connect frequency counter between point Z and earth and adjust the oscillator coil (L 103) core to give an indicated value of 105 kHz.

HF wave traps

Connect the millivoltmeter (AC) or oscilloscope to R 122 (left channel) and R 222 (right channel) and, using wave trap L 102 or L 202, adjust for minimum HF.

HF-magnetic bias

Insert test cassette, Cr-reference medium section.

Cr, record, ►

For basic adjustment, a millivoltmeter (AC) may be inserted between measuring point X (right channel) or Y (left channel) and earth. For basic adjustment, a value of 55 mV is set using VR 105 or VR 106.

More precise adjustment should be carried out in the following manner:

Record 400 Hz and 10 kHz with –20 dB (VU-meter). Compare the levels on reproduction. If there is no uniform level, correct HF bias.

For alignment of track 1 (left channel) use VR 106.

For alignment of track 2 (right channel) use VR 105.

Less HF bias = treble emphasis

More HF bias = treble de-emphasis

Insert test cassette, **Fe-reference medium section**

Fe, record, ►

Record 400 Hz and 10 kHz with –20 dB (VU-meter). Compare the levels on reproduction. If there is no uniform level, correct HF bias using VR 108.

Insert test cassette, **FeCr-reference medium section**

FeCr, record, ►

Record 400 Hz and 10 kHz with –20 dB (VU-meter). If there is no uniform level, correct HF bias using VR 107.

Record level

Insert test cassette, CrO₂-reference medium section

Cr, record, Dolby NR, MPX, ►

Line/DIN level control (P 101 and P 201) open. Record 400 Hz with 0 dB (VU-meter) and then check playback level using the VU-meters.

Using VR 104 (VU-meter left) and VR 204 (VU-meter right) alter the recording current so that the playback level is equal to the record level.

Overall frequency response

The overall frequency response for all types of tape must lie within the specified tolerances in accordance with DIN 45 500, sheet 4. Recording should take place at a level of –26 dB as indicated on the VU-meters.

Fig. 1 Alignment positions (equipment side)

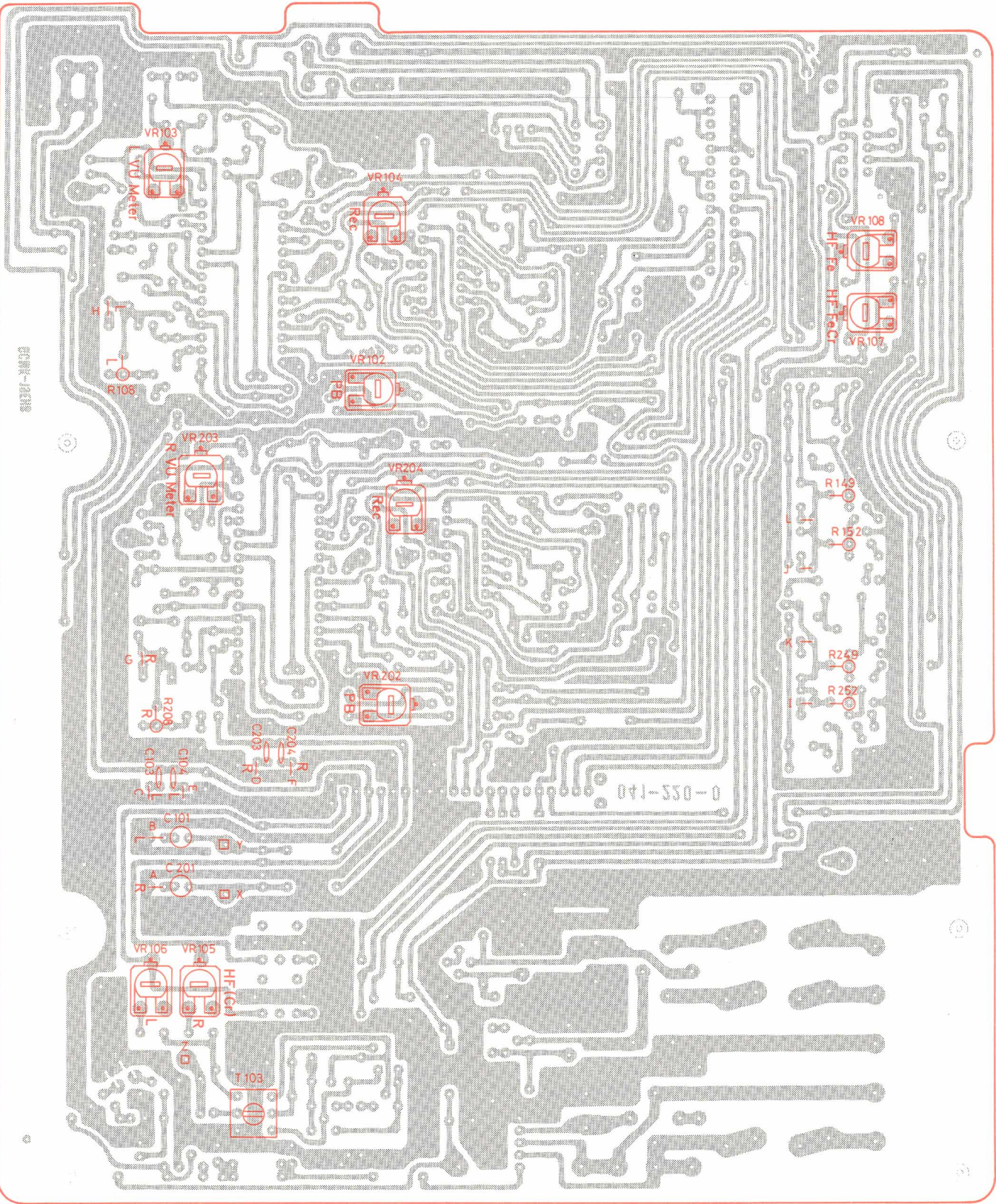


Fig. 2 Connection bush plate (printed wiring side)

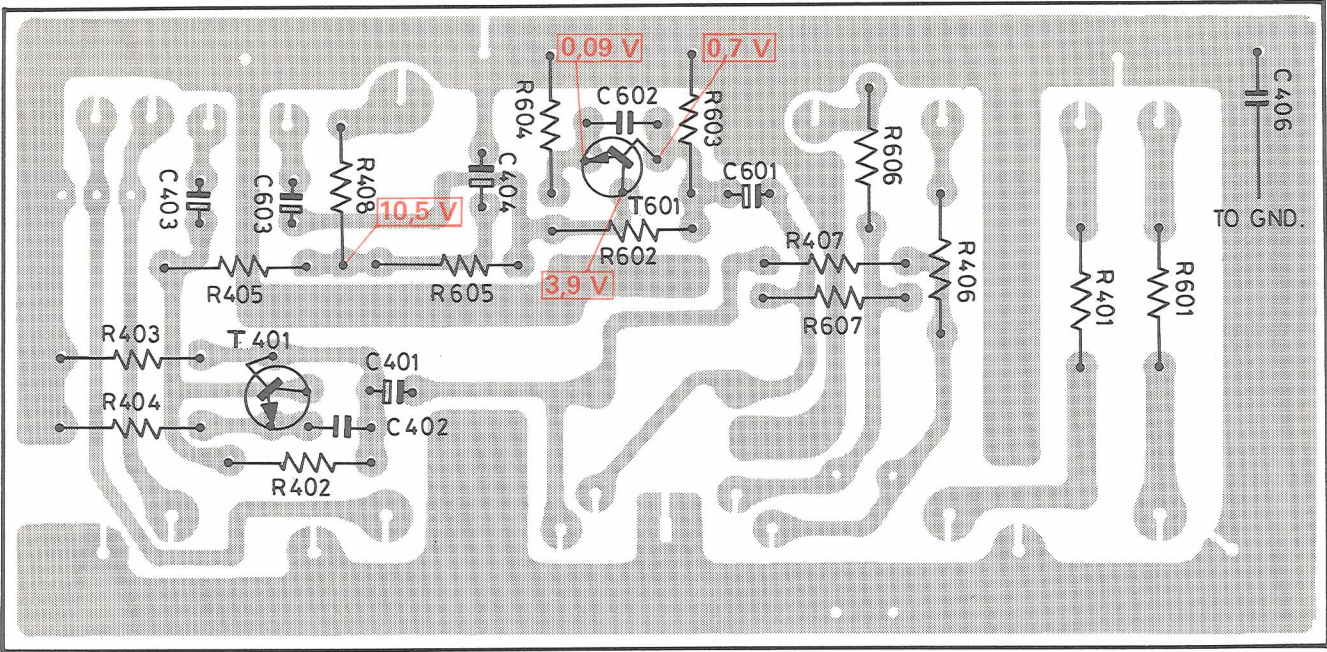


Fig. 3 Final shutt-off plate (printed wiring side)

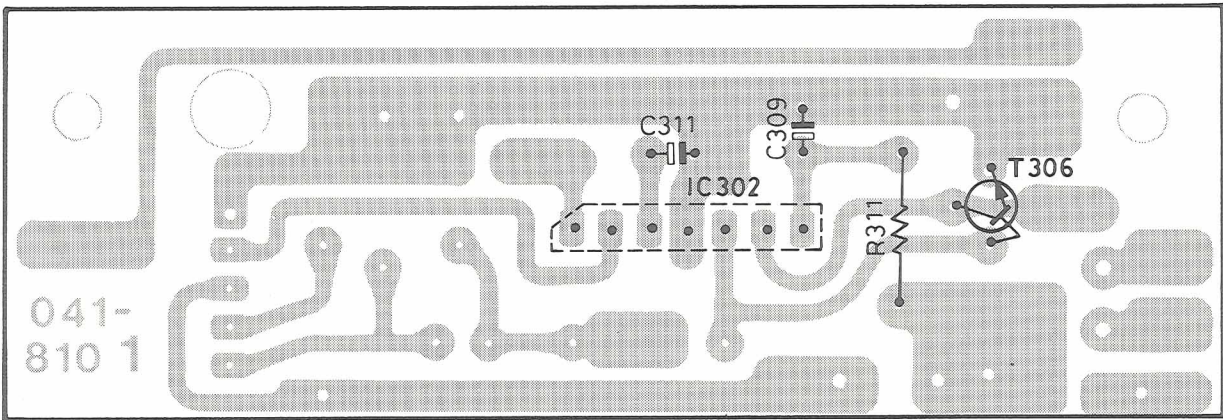


Fig. 4 Power plate (printed wiring side)

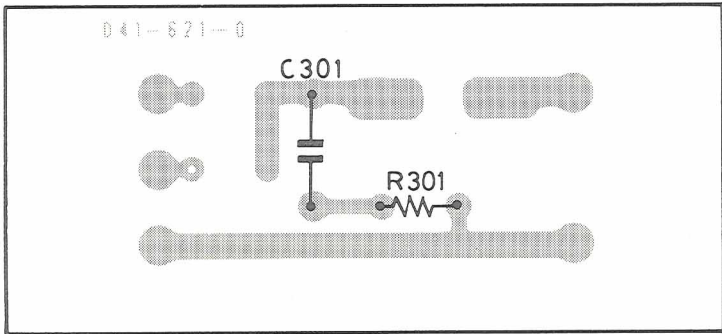
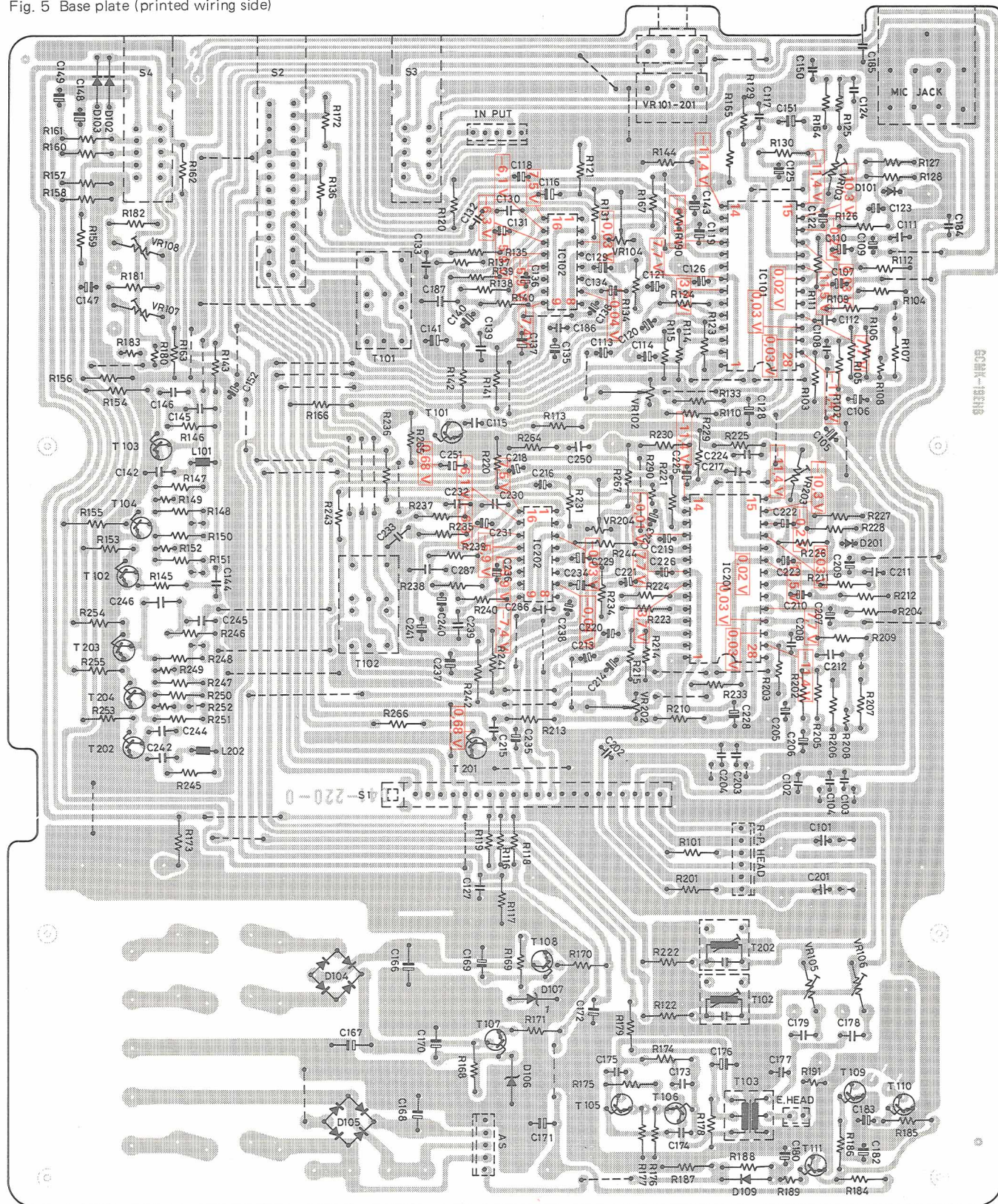


Fig. 5 Base plate (printed wiring side)



Mechanical section

General information

The item numbers listed refer to the lists of replacement parts and exploded diagrams below.

1. Removing the housing plate 1 and the baseplate

Remove the four machine screws **2** and the four washers **3**. Withdraw the housing plate **1** from behind.
In order to remove the baseplate, the four machine screws **44** on the underside of the unit should be loosened and both the supporting feet **41** and the three sheet metal screws must be removed.

2. Removing the fascia 18

Remove the housing plate **1** as described above.
Withdraw the rotary turn switches **31** and **32**, the four push keys **21** and the rotary turn switch **20**.
The three countersunk head screws **19** on the upper and lower fascia should be removed.
The fascia **18** may now be taken off.

3. a) Removing the cassette retaining plate 117

When repairing the mechanical section, it is advisable to remove the cassette retaining plate **117** complete with both stop buttons **116**. To do this, proceed in the proper fashion as follows:
Press the connecting spindle **12** into the bearing spindle **10** and remove it. Pivot the protective head cover **118** upwards. With the aid of a screwdriver, extract both retaining lugs **L** on the cassette retaining plate **117**. Carefully withdraw the cassette retaining plate **117** from the unit and remove the bulb **114** together with its rubber socket.

b) Disengaging the contactor on the cassette retaining plate 123

In order to check the playback or fast wind/rewind function without inserting a cassette, the contactor **F** of the cassette grip **123** must be disengaged as follows:
Operating the playback key or the fast wind/rewind key, the contactor **F** must be disengaged from the left cassette grip **123**, thereby allowing the key to click into position.

4. Motor

a) Replacement

In order to replace the motor **154**, the motor belt and the flat belt should be firstly removed from the drive pulley **141**. Rotate the motor in a counterclockwise direction — bayonet-type socket — and remove the motor **154**. Now solder off the connection leads from the printed circuit board.
Loosen the grub screw and remove the drive pulley **141**. Screw off the retaining plate of the motor **154** and fix it to the new motor.
Place the drive pulley **141** onto the spindle of the new motor **154**. Set the clearance gap between drive pulley **141** and retaining plate at approximately 0.3 mm, then tighten the grub screw (fig. 7). Solder the connection leads to the printed circuit board (red = plus). Insert the motor into the unit and, by rotating it in a clockwise direction — bayonet-type socket — lock it in position. Replace the flat belt and motor belt onto the drive pulley **141**.

b) Motor speed — tape speed

Test assembly as described below under 6. "Speed accuracy."
The tape speed may be adjusted by means of an insulated screwdriver on the reverse side of the motor (fig. 7).
The speed is correctly adjusted if the measured result is between -1 and +0.5 % deviation.

5. Drive belts

In order to replace defective drive belts — belt arrangement diagram fig. 8 —, proceed as follows:
The motor belt **A** may be removed or replaced with no difficulty. Remove the three machine screws **183**. Take off the lower plate **155**. The flat belt **B** and the counter belt **C** may now be replaced. Withdraw the flywheel **144** from the bearing bush.

Fig. 6

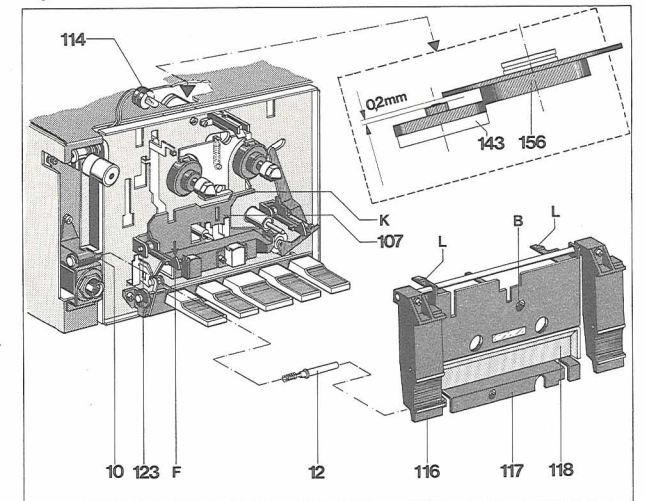


Fig. 7

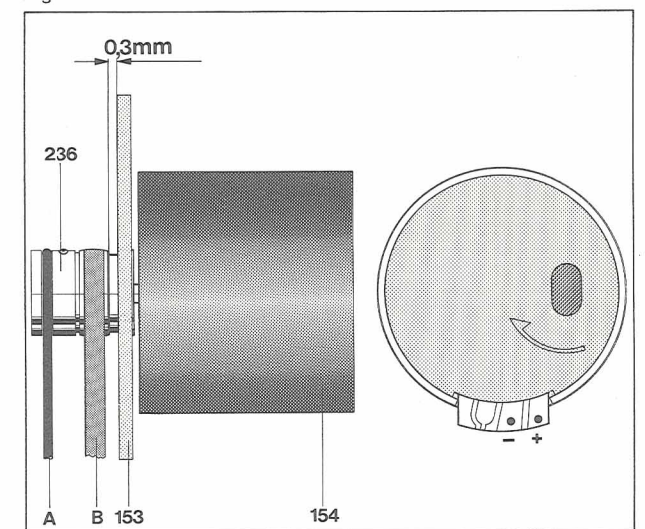
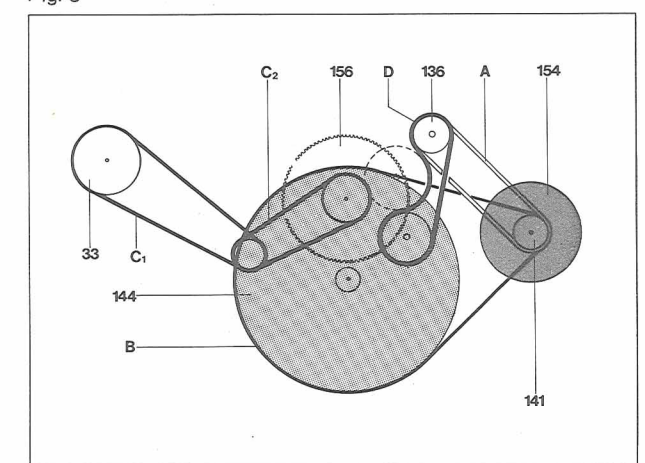


Fig. 8



Important:
The polyethylene washer **174** on the front side of the unit will fall out.
The counter belt **C 2** and the take-up belt **D** may now be replaced. When the belts have been properly replaced, replace the polyethylene washer **174** onto the spindle (capstan) of the flywheel **144**. Furthermore, it is advisable to press the fast forward or rewind key and to clean the capstan and the drive belt with a cloth soaked in methylated spirit.

6. Speed accuracy

Measure with a Wow meter (e.g. Woelke ME 101 or ME 104 or Franz EMT 420 A) and Wow test cassette 3150.

Setting the test instrument:

0.3 % measurement range, weighted.

Important: In order to avoid incorrect measurement caused by jamming tape travel, it is recommended to operate the forward and rewind button with the test cassette inserted.

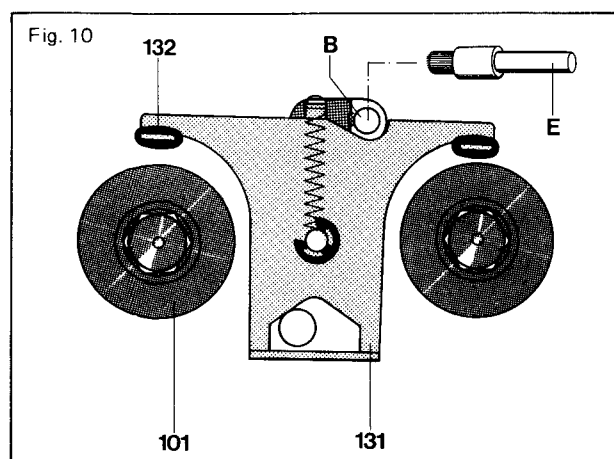
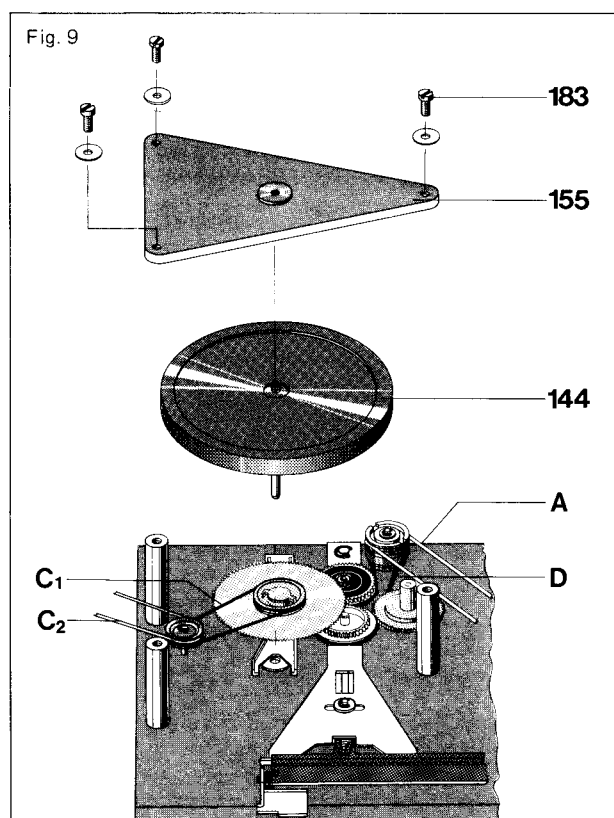
Typical measured values (playback) of the Dual cassette deck.

$\pm 0.08 - 0.12 \%$

Individual higher deflections should not be weighted since they are the result of bad tape-head contact caused by detrition, dust or felt particles.

If necessary, check the following points:

- Clean pinch roller and capstan
- Check pinch roller for freedom of movement



c) The take-up torque, which is adjusted at the coupling, should be $55 \pm 1 \text{ mN m}$ ($55 \pm 10 \text{ pcm}$). Slightly fluctuating values have no effect on the speed accuracy. At the same time, the torque on the non-driven side should be $2 - 6 \text{ pcm}$. A higher or varying value suggests that the bearing of the left winding gear is defective.

d) Replace the flat belt

e) Replace flywheel

7. Pressure lever

$0.1 \text{ mN m} = 1 \text{ pcm}$

The pressure lever **128** and the V spring **127** may be removed after the lock washer **167** has been loosened. Reassembly involves the reverse procedure. However, please ensure that the V spring **127** is correctly repositioned. With the pause button disengaged (device switched to play), the pinch roller should be pressed against the capstan by the V spring **127** with a force of $400 \text{ p} \pm 100 \text{ p}$. If necessary, this should be altered by pretensioning of the V spring **127**.

Correct functioning of the pressure lever **128**, may also be checked using the test cassette (Dual item no. 232 797) in the following manner.

Insert the test cassettes. Press the play key. Brake the driver **101** on the supply reel side slowly until the reel comes to a stop. The tape tension should be greater than 10 mN m (100 pcm). With the "pause" button engaged and the start button completely depressed, the clearance between the capstan and the pinch roller should be $0.4 - 1 \text{ mm}$. This may be adjusted by bending the pressure lever.

8. Brake plate

When replacing the rubber sleeves **122** on the brake plate **131**, please bear the following in mind:

During fast forward/rewind, there must be a clearance on the non-driven side of $0.1 - 0.2 \text{ mm}$ between the rubber sleeve and the brake drum of the driver **101**. If necessary, bend the lugs on the brake plate **131** (fig. 10).

9. a) Coupling

To ensure satisfactory winding, the winding torque of the coupling must be correct. The tape tension during winding should be $5.5 \pm 1 \text{ mN m}$ ($55 \pm \text{pcm}$). This should be measured using a test cassette (Dual part number 232 797). Readjustment of the entire device may be carried out as follows:

- Isolate the unit from the mains!
- Press the fast rewind key ($\ll$).
- Rotate the left driver **101** until 1 of the 2 adjustment holes becomes visible through the aperture **B** in the cassette retaining plate (fig. 10). Then, using the special adjustment key **E** (Dual part number 203 933), adjust the take-up torque. Rotation in a clockwise direction increases the take-up torque. Rotation in a counter clockwise direction reduces the take-up torque.

b) Coupling pulley torque

In order to ensure uniform torque during fast wind/rewind, the upper section of the coupling pulley **136** is separated from the lower drive diameter of the take-up belt by a friction coupling (fig. 11).

Checking:

Insert the special torque test cassette (Dual part number 238 600). Press the fast forward/rewind key. Over a series of measurements, open and close the cassette grip **123** so that the pointer returns to "0" on both scales. The torque should measure $8 - 13 \text{ mN m}$ ($80 - 130 \text{ pcm}$). Typical values for new drive pulleys are $9 - 14 \text{ mN m}$ ($90 - 140 \text{ pcm}$). If necessary, hold the coupling pulley **136** in a fixed position. Adjust the friction coupling as necessary with the aid of a spanner or flat-nosed pliers.

Important: The main belt **A** must not display any signs of slip or dirt contamination!

10. Fast rewind

There must be a minimum clearance of 0.2 mm between the right winding gear **156** and the coupling pulley **143**. If necessary, the lug **K** on the head mounting plate **107** should be bent slightly (refer to figure 6).

11. Record lever

The record lever should be adjusted in such a way that, when the record button is depressed, the record/playback switch **S 1** rests against the stop. This may be adjusted by bending the record lever.

12. Record/playback head, erase head

When replacing the record/playback head **103**, please note the following prior adjustment process.

Place the record/playback head **103** together with the leaf spring onto the head mount. Then, by means of the sleeves and machine screws **Z**, it should be secured so that the tape guides **B** are in line with the tape guides on the head mount **B 1** and those on the erase head **B 2** (fig. 12). Final adjustment should be undertaken in the manner described in the section "electrical alignment".

13. Cleaning/lubrication

Always clean the unit when servicing it or repairing it. In order for the unit to function properly, the record/playback head **103**, the erase head **102**, the pinch roller **128** and the capstan should always be spotlessly clean. These parts are best cleaned with a cotton cloth or cotton bud soaked in methylated spirit. On no account should metal objects be used. The surface of the head should never be touched with bare fingers. All bearing and sliding parts are adequately lubricated at the works. Re-lubrication is not normally required for several years, since most important parts are provided with oil reservoirs. The motor bearings are designed as long life oil reservoirs and therefore require no lubrication.

Fig. 11

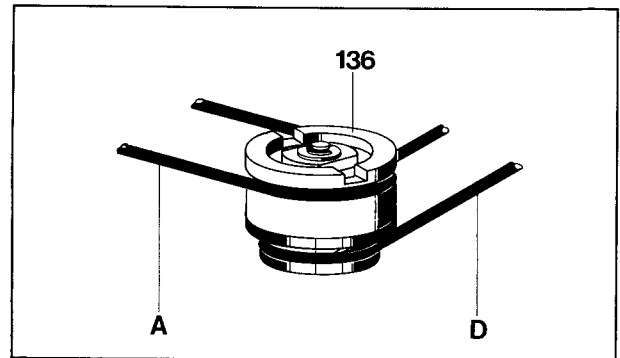
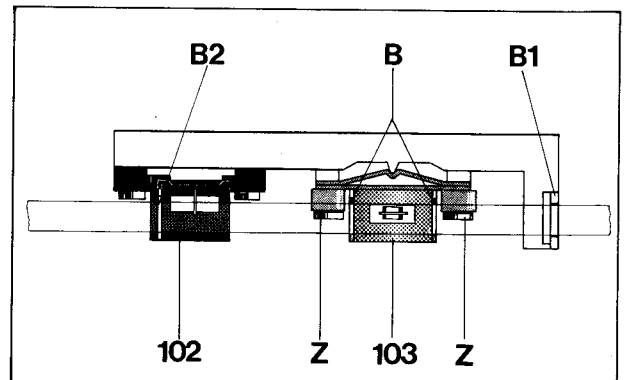


Fig. 12



Replacement parts

Pos.	Part.No.	Qty	Description
1	263 040	1	Housing plate
2	226 856	4	Machine screw M 4 x 8
3	239 049	4	Washer 4,3
4	262 946	1	V-spring
5	263 010	1	Push button
6	262 913	1	Power switch (Europe) (S 8)
	262 914	1	Power switch (USA/Canada) (S 8)
7	262 969	1	Leaf spring
8	210 480	1	Machine screw M 3 x 6
9	263 006	1	Bearing bracket
10	263 007	1	Bearing spindle
11	262 948	1	Pressure spring
12	262 992	1	Connecting spindle
13	263 005	1	Bearing lever
18	263 244	1	Front trim plate metallic
	263 245	1	Front trim plate metallic brown
19	203 475	10	Countersunk head screw M 3 x 8
21	263 000	3	Push button
22	263 045	1	Front frame

Pos.	Part.No.	Qty	Description
23	210 488	2	Machine screw
24	263 046	1	Head cover
27	262 991	1	Record lever
30	262 937	1	Felt disc
31	262 998	1	R rotary turn switch
32	262 997	1	L rotary turn switch
33	263 246	1	Counter complete
	240 880	1	Headphone jack
34	263 224	1	Mic jack
35	263 247	1	Rear panel Europe
	263 248	1	Rear panel USA/Canada
36	263 050	1	Power transformer Europe
	263 051	1	Power transformer USA/Canada
37	243 750	1	Power cable Europe
	232 995	1	Power cable USA/Canada
38	237 548	1	Grommet for electrical system with pull relief
39	262 925	1	Power board unequipped Europe
	262 926	1	Power board unequipped USA/Canada

Fig. 13 Exploded view

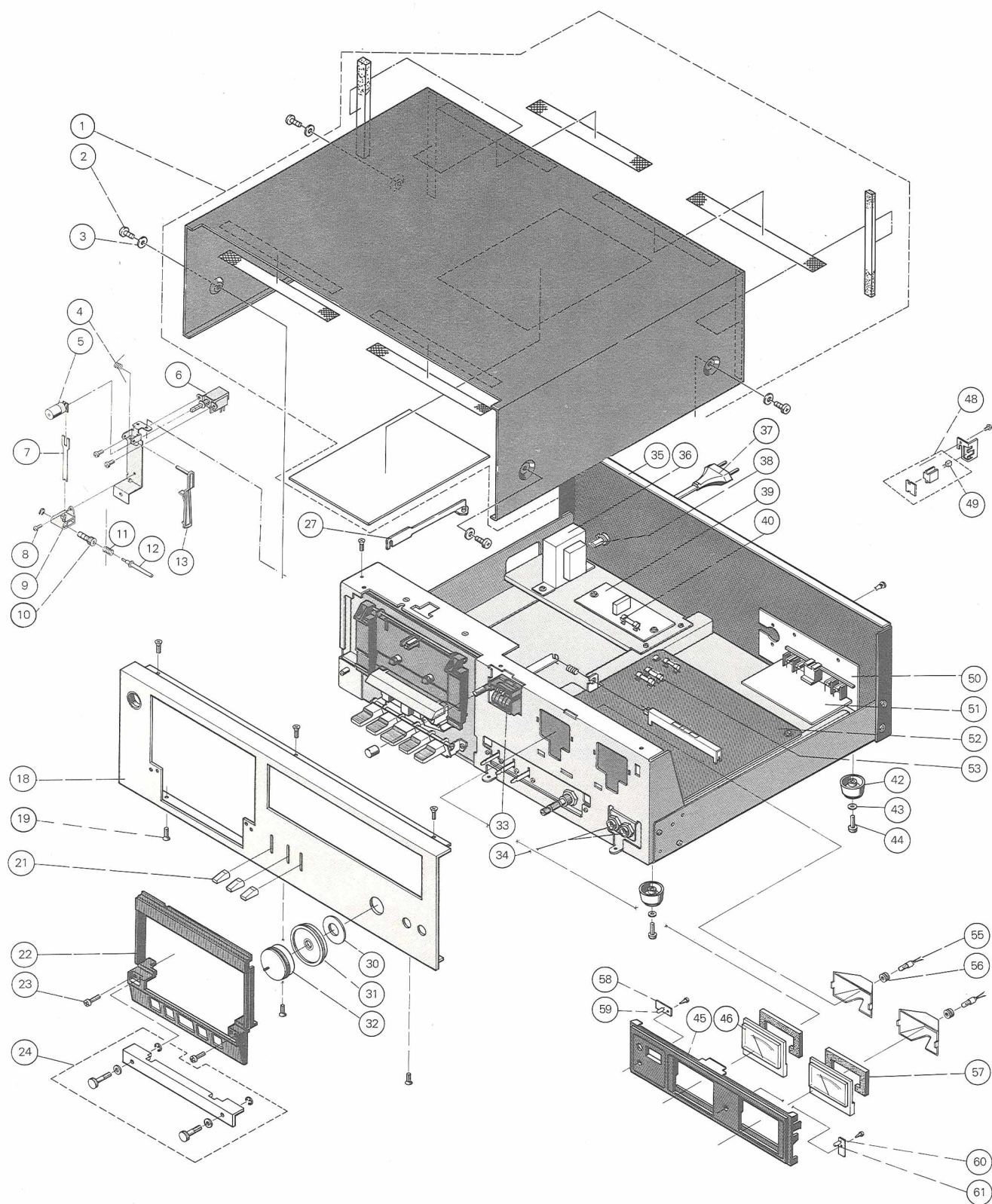
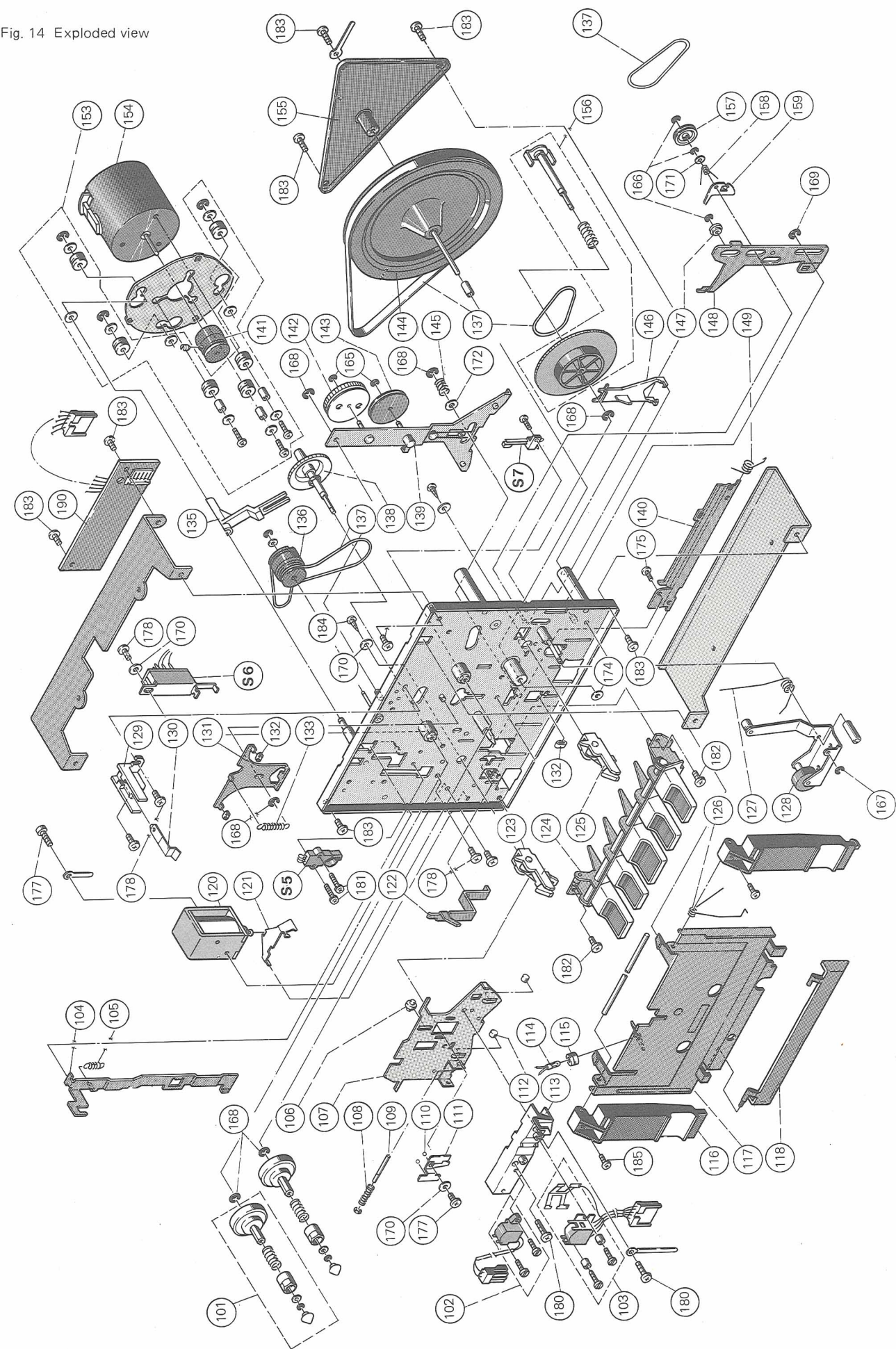


Fig. 14 Exploded view



Pos.	Part.No.	Qty	Description
40	244 819	1	Fuse insert T 0.5 A/250 V
42	262 949	4	Unit support
43	210 586	4	Washer
44	210 492	4	Machine screw M 3 x 15
45	263 237	1	Indicator frame complete
46	263 250	2	Indicator complete
48	263 055	1	Tape motion monitor complete
49	263 029	1	Integrated circuit DN 6838 (IC 301)
50	263 056	1	Connection jack board complete
51	263 251	1	Connection board complete
T 401	263 026	2	2 SC 1327 U
			Base plate
52	263 252	1	Base plate complete
53	209 726	3	G-fuse insert T 0,4 A
D 101	209 867	2	1 N 60
D 102	263 034	3	DD 1 S 2473
D 103	263 034	3	DD 1 S 2473
D 104	247 651	2	DR W 005
D 105	247 651	2	DR W 005
D 106	263 238	2	DZ UZ-12 B
D 107	263 238	2	DZ UZ-12 B
D 109	263 034	3	1 S 2473
L 100	247 672	2	Coil 2.2 mH
L 101	262 912	2	MPX filter
L 102	262 905	2	Coil
L 103	263 221	1	Oscillator coil
S 1	263 225	1	Switch (record)
S 2	263 227	1	Switch (Dolby/MPX)
S 3	263 226	2	Switch (input)
S 4	263 226	2	Switch (tape)
T 101	263 025	11	2 SC 828-S
T 102	263 025	11	2 SC 828-S
T 103	263 025	11	2 SC 828-S
T 104	262 025	11	2 SC 828-S
T 105	245 356	2	2 SC 828 A-RS
T 106	245 356	2	2 SC 828 A-RS
T 107	263 027	1	2 SC 1383 NC-R
T 108	263 240	1	2 SA 683 NC-R
T 109	263 025	11	2 SC 828-S
T 110	263 025	11	2 SC 828-S
T 111	263 025	11	2 SC 828-S
IC 101	263 239	2	TA 7617 AP
IC 102	247 656	2	LM 1011 A
VR101	262 911	2	Trimmer 50 k Ω
VR102	263 041	2	Trimmer 20 k Ω
VR103	263 223	2	Trimmer 200 k Ω
VR104	229 938	2	Trimmer 5 k Ω
VR105	238 163	2	Trimmer 100 k Ω
VR106	238 163	2	Trimmer 100 k Ω
VR107	263 222	2	Trimmer 500 Ω
VR108	263 222	2	Trimmer 500 Ω
55	263 232	3	Glow lamp 16 V/60 mA
56	228 209	2	Rubber sleeve
57	247 599	2	Separator
58	263 230	1	LED board complete
59	263 039	1	LED TLG 124 green
60	263 231	1	LED board complete
61	263 038	1	LED TLG 124 red
	246 964	1	Shipping carton
	260 866	1	Operating instructions
101	263 058	2	Driver assembly complete
102	235 455	1	Erase head complete
103	235 454	1	Record/playback head complete
104	262 959	1	Record rail
105	262 939	1	Tension spring
106	262 971	1	Pulley B
107	262 960	1	Head mounting plate
108	262 942	1	Pressure spring
109	262 950	1	Spindle
110	209 353	2	Ball ϕ 2

Pos.	Part.No.	Qty	Description
111	262 966	1	Stop spring
112	262 970	2	Pulley A
113	262 951	1	Head mounting
114	246 782	1	Lamp 15 V/50 mA
115	228 200	1	Rubber sleeve
116	263 060	2	Stop key
117	263 061	1	Cassette retaining plate
118	263 062	1	Head view finder
120	263 063	1	Pull magnet
121	262 958	1	Release
122	262 965	1	Stop arm
123	262 984	1	Left cassette retainer complete
124	263 064	1	Pushbutton panel complete
125	262 985	1	Right cassette retainer complete
126	262 947	1	V-spring
127	262 945	1	V-spring
128	263 065	1	Pressure lever complete
129	262 986	1	Cassette stop
130	262 967	1	Leaf spring
131	262 961	1	Brake plate
132	262 989	3	Rubber sleeve
133	262 938	1	Tension spring
135	262 963	1	Slotted jaw
136	263 066	1	Coupling pulley complete
137	264 113	1	Belt set complete
138	263 068	1	Winding gear left complete
139	262 954	1	Main lever
140	262 957	1	Retaining plate
141	263 069	1	Drive pulley complete
142	262 974	1	Coupling
143	262 975	1	Intermediate gear
144	263 070	1	Driven plate
145	262 941	1	Pressure spring
146	262 953	1	Coupling lever
147	262 973	1	Spacer pulley
148	262 955	1	Pause lever
149	262 944	1	V-spring
153	245 770	1	Motor mounting assembly
154	245 769	1	Motor complete
155	263 071	1	Bottom plate complete
156	263 042	1	Winding gear right complete
157	262 988	1	Intermediate gear
158	262 943	1	V-spring
159	262 956	1	Switch latch
165	210 142	3	Lock washer 1.2
166	210 143	6	Lock washer 1.5
167	210 144	1	Lock washer 1.9
168	210 145	7	Lock washer 2.3
169	210 146	4	Lock washer 3.2
170	210 586	5	Washer 3.2
171	210 549	1	Washer 2.1
172	257 138	1	Washer 3.7
173	243 237	1	Washer 1.5
174	210 556	1	Polythene washer 2.4/6/0.5
175	220 876	1	Machine screw M 2.6 x 3
176	223 774	4	Machine screw M 2.6 x 6
177	210 469	1	Machine screw M 3 x 3
178	210 472	6	Machine screw M 3 x 4
179	210 486	3	Machine screw M 3 x 8
180	210 488	2	Machine screw M 3 x 12
181	210 433	2	Machine screw M 2 x 8
182	210 475	2	Machine screw M 3 x 5
183	210 480	4	Machine screw M 3 x 6
184	213 471	2	Self-tapping screw B 2.9 x 6.5
185	217 616	2	Machine screw M 2.6 x 8
S 7	262 918	1	Microswitch (pause)
S 6	262 915	1	Slide switch (muting)
S 5	262 920	1	Contact (play)
190	263 023	1	Tape-end switch-off board complete
D 305	263 036	2	SR 1 K-2
310	263 036	2	SR 1 K-2
T 306	263 028	1	2 S D 592 NC-S
IC 302	263 030	1	AN 6250

Alterations reserved!